

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) ~~A communication device for coupling~~ An X-DSL transceiver configured to couple to a communication medium to communicate frequency division multiplexed upstream and downstream portions of at least one multi-tone modulated communication channel thereon via an analog signal with a multi-tone modulation; and the communication device X-DSL transceiver comprising:

~~a converter for converting the analog signal from the communication medium to digital samples and vice versa; and~~

~~a Fourier transform engine digital signal processor (DSP) coupled to the converter configured to select a processing interval inversely corresponding with bandwidth availability on the communication medium for transforming each set of tones associated with the at least one multi-tone modulated communication channel from between a time domain to and a frequency domain, successive tone sets represented by the digital samples to demodulate the at least one communication channel and vice versa, and the Fourier transform engine providing a selectable tone spacing for the successive tone sets of the at least one communication channel to alter a bandwidth of the at least one communication channel across the communication medium, whereby an initial determination of a relatively high bandwidth availability on the communication medium results in a selection of a relatively shorter processing interval for each tone set and a correspondingly greater number of tone sets processed in a given amount of time, thereby increasing a bandwidth of the multi-tone modulated communication channel by increasing the bandwidth of each individual tone within each set of tones and vice versa.~~

2. (Currently Amended) The ~~communication device~~ X-DSL transceiver of Claim 1, further comprising:

an digital-to-analog converter (DAC) coupled to the communication medium and performing a digital-to-analog conversion of the at least one multi-tone modulated communication channel at a fixed sample rate; and

~~a variable an interpolator with an input coupled to~~ coupling the Fourier transform engine DSP and an output coupled to the converter DAC, and the interpolator configured to vary an amount of interpolation for interpolating the of digital samples the at least one multi-tone modulated communication channel from the Fourier transform engine in direct correspondence with the duration of the corresponding processing interval selected by the DSP, whereby tone sets processed in the DSP at the relatively shorter duration processing interval will be subject to relatively smaller amounts of interpolation and vice versa, thereby by an amount which corresponds inversely with the selected tone spacing to allow allowing the converter DAC to convert the digital samples to the analog signal at maintain the a fixed sampling sample rate, for all the selectable tone spacings provided by the Fourier transform engine.

3. (Currently Amended) The ~~communication device~~ X-DSL transceiver of Claim 1, further comprising:

an analog-to-digital converter (ADC) coupled to the communication medium and performing a analog-to-digital conversion of the at least one multi-tone modulated communication channel at a fixed sample rate; and

a variable decimator with an input coupled to coupling the converter ADC and an output coupled to the Fourier transform engine DSP, and the decimator configured to vary an amount of decimation of the at least one multi-tone modulated communication channel in direct correspondence with the duration of the corresponding processing interval selected by the DSP, whereby tone sets processed in the DSP at the relatively shorter duration processing

~~interval will be subject to relatively smaller amounts of decimation and vice versa, for decimating the digital samples from the converter by an amount which corresponds inversely with the selected tone spacing to thereby allow allowing the converter to convert the analog signal to digital samples at a fixed sampling rate for all the selectable tone spacings provided by the Fourier transform engine, to maintain the fixed sample rate.~~

4. (Currently Amended) The communication device X-DSL transceiver of Claim 1, wherein the ~~at least one~~ communication medium comprises a plurality of subscriber lines; the at least one multi-tone modulated communication channel comprises a plurality of multi-tone modulated communication channels each associated with a corresponding one of the plurality of subscriber lines; and wherein further comprising:

~~the Fourier transform engine~~ DSP supports modulation and demodulation of configured to independently select for each of the plurality of multi-tone modulated communication channels: a corresponding processing interval which inversely corresponds with bandwidth availability on the associated communication medium.

5. (Currently Amended) The communication device X-DSL transceiver of Claim 1, wherein the ~~Fourier transform engine~~ DSP supports modulation and demodulation of the at least one multi-tone modulated communication channel in a plurality of multi-tone protocols, ~~with a distinct number of tones within each associated tone set and with the Fourier transform engine supporting for at least one of the multi-tone protocols the selectable tone spacing.~~

6. (Currently Amended) The communication device X-DSL transceiver of Claim 1, wherein the ~~Fourier transform engine~~ provides the selectable tone spacing by providing a selectable processing interval for transforming the successive tone sets of the at least one communication channel between the time and the frequency domains: further comprising:

an digital-to-analog converter (DAC) coupled to the DSP and the communication medium and the DAC performing a digital-to-analog conversion of the at least one multi-tone modulated communication channel at a sample rate which corresponds inversely with respect to the processing interval selected by the DSP; and

an analog-to-digital converter (ADC) coupled to the communication medium and the DSP and the ADC performing a analog-to-digital conversion of the at least one multi-tone modulated communication channel at the sample rate which corresponds inversely with respect to the processing interval selected by the DSP.

7. (Currently Amended) ~~The communication device~~ X-DSL transceiver of Claim 1, ~~with the tone spacing for successive tone sets of the at least one communication channel determined by a bandwidth availability on the communication medium wherein the at least one communication medium comprises a plurality of subscriber lines; the at least one multi-tone modulated communication channel comprises a plurality of multi-tone modulated communication channels each associated with a corresponding one of the plurality of subscriber lines; and further comprising:~~

the DSP configured to independently select for each of the plurality of multi-tone modulated communication channels a corresponding processing interval which inversely corresponds with bandwidth availability on the associated communication medium; and

a scheduler coupled to the DSP to schedule processing therein of the plurality of multi-tone modulated communication channels based on criteria including the associated processing intervals for each of the plurality of multi-tone modulated communication channels.

8. (Currently Amended) ~~The communication device~~ X-DSL transceiver of Claim 1, wherein ~~the at least one communication medium comprises one of a wired and a wireless medium.~~

9. (Currently Amended) ~~A logical modem coupling to a communication medium to communicate at least one communication channel thereon via an analog signal with a multi-tone modulation; and the communication device comprising: The X-DSL transceiver of Claim 1, further comprising:~~

~~an at least one analog front end (AFE) coupled between the communication medium and the DSP for converting the analog signal from the communication medium to digital samples and vice versa; and performing analog-to-digital and digital-to-analog conversion of the at least one multi-tone modulated communication channel.~~

~~a digital signal processor (DSP) coupled to the AFE for transforming from a time domain to a frequency domain successive tone sets represented by the digital samples to demodulate the at least one communication channel and vice versa; and DSP providing a selectable tone spacing for the successive tone sets of the at least one communication channel to alter a bandwidth of the at least one communication channel across the communication medium.~~

10-16. (Canceled)

17. (Currently Amended) A method in an X-DSL transceiver for communicating at least one multi-tone modulated communication channel across a communication medium ~~via an analog signal with a multi-tone modulation~~; and the method comprising the acts of:

determining a bandwidth availability for the at least one multi-tone modulated communication channel on the communication medium;

selecting a processing interval for each successive set of tones of the at least one multi-tone modulated communication channel based on the bandwidth availability determined in the determining act;

~~converting the analog signal from the communication medium to digital samples and vice versa;~~

transforming each successive set of tones in the processing interval selected in the selecting act from between a time domain to and a frequency domain successive tone sets represented by the digital samples to demodulate the at least one multi-tone modulated communication channel and vice-versa; and, whereby the determination in the determining act of a relatively high bandwidth availability on the communication medium results in a selection in the selecting act of a relatively shorter processing interval for each successive set of tones and a correspondingly greater number of tone sets processed in a given amount of time, thereby increasing a bandwidth of the multi-tone modulated communication channel by increasing the bandwidth of each individual tone within each set of tones and vice versa.

selecting a tone spacing for the successive tone sets of the at least one communication channel to alter a bandwidth of the at least one communication channel across the communication medium.

18. (Currently Amended) The method of Claim 17, further comprising:

variably interpolating the digital samples transformed in the transforming act by an amount which corresponds inversely with the tone spacing selected in the selecting act to allow the converting of the digital samples to the analog signal at a fixed sampling rate.

selecting an amount of interpolation of successive tone sets of the at least one communication channel transformed from the frequency to the time domain in the transforming act to correspond directly with the duration of the corresponding processing interval selected in the selecting act, whereby tone sets transformed at the relatively shorter duration processing interval will be subject to relatively smaller amounts of interpolation and vice versa; and

performing a digital-to-analog conversion of the at least one multi-tone modulated communication channel onto the communication medium at a fixed sample rate.

19. (Currently Amended) The method of Claim 17, further comprising

~~variably decimating the digital samples converted in the converting act by an amount which corresponds inversely with the tone spacing selected in the selecting act to allow the converting of the analog signal to digital samples at a fixed sampling rate.~~

selecting an amount of decimation of successive tone sets of the at least one multi-tone modulated communication channel transformed from the time to the frequency domain in the transforming act to correspond directly with the duration of the corresponding processing interval selected in the selecting act, whereby tone sets transformed at the relatively shorter duration processing interval will be subject to relatively smaller amounts of decimation and vice versa; and

performing an analog-to-digital conversion of the at least one multi-tone modulated communication channel from the communication medium at a fixed sample rate.

20. (Currently Amended) The method of Claim 17, ~~wherein the selecting act further comprises the acts of~~ further comprising the act of:

~~determining a bandwidth availability of the communication medium; and~~

~~selecting the tone spacing for the successive tone sets based on the bandwidth availability determined in the determining act.~~

performing corresponding digital-to-analog and analog-to-digital conversions of each successive tone set transformed in the transforming act at sample rates which corresponds inversely with respect to the processing interval selected by the DSP.